SCHOOL OF
ENGINEERING
& APPLIED SCIENCE

DEPARTMENT OF MECHANICAL, AEROSPACE
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May 20, 1996

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW
Room 222
Washington, DC 20054

RM 8784

Re: Comments regarding
File No. 96-SAT-P/LA-96

Dear Mr. Caton:

It is a great pleasure to have the opportunity to comment on the development of a new technology. The proposal by Sky Station International to develop solar-powered airships using a corona ion-engine for propulsion and stationing them in the stratosphere is certainly revolutionary. Although we can see the merit of this proposal for global stratospheric telecommunication we would like to comment on the relevance and importance of this development to an unrelated project that we intend to develop here at the University of Virginia.

We are currently developing a new approach for atmospheric measurements. As you certainly know, two of the major environmental problems of our time - global warming and ozone depletion - are triggered by the presence of minor species in the atmosphere. We would like to develop new capabilities for monitoring these low-concentration species at any location and for long periods of time. To achieve this, we are planning to station an airship in the stratosphere and by using a laser beam directed towards the ship to obtain new and highly sensitive monitoring capabilities. The proposed approach may also be used in numerous other applications such as for monitoring the development of nascent hurricanes and tracking them once they develop, to measure scattering of solar radiation by atmospheric aerosols and much more. Key to these is the development of an airship that can be stationed in the stratosphere. Until now only balloons could reach this altitude and stay there. However, lacking any propulsion balloons were drifting. The only presently available alternative for powered exploration of the stratosphere requires the use of rockets.

The proposed development by Sky Station International of a corona ion engine to provide propulsion to solar-powered airships would present a remarkable breakthrough. Not only will we be able to reach the stratosphere and stay there, but in the process we will not pollute it. Unlike rockets, solar-powered airships do not deplete any terrestrial energy

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resources nor do they pollute their environments. Furthermore, the availability of such new vehicle will not only revolutionize the field of telecommunication but also other fields such as atmospheric science which until now often required space-born vehicles.

I am certain that you will give a careful consideration to the request of Sky Station International. The intent of this letter is to assist you by presenting other, potentially revolutionary aspects of their proposal.

Sincerely yours,

Gabriel Laufer, Ph.D
Associate Professor

Roland H. Krauss, Ph.D
Associate Professor

Gabriel Laufer
Aerospace Research Laboratory, University of Virginia, 570 Edgemont Road, Charlottesville, VA 22903, (804)-982-5353.

Dr. Gabriel Laufer is an Associate Professor of Mechanical and Aerospace Engineering at the University of Virginia where he acts as the coordinator of the Aerospace Engineering program. He received a B.Sc. degree from Technion in Aeronautical Engineering in 1970 and a Ph.D. degree in Aerospace and Mechanical Engineering from Princeton University in 1979. His graduate research work resulted in the development of a new laser technique for combustion species diagnostics. After graduation, Dr. Laufer was a member of the research staff at Western Electric Co. and concurrently a Visiting Research Fellow at Princeton University. There he developed sensitive surface analysis methods that allowed optical detection of adsorbed single molecular layers. In 1980 Dr. Laufer joined the Faculty of the Department of Mechanical Engineering in Technion-Israel where he was the Director of the Industrial Laser Laboratory. While there he also collaborated with a local hospital in developing methods that can effectively reduce residual tissue damage induced by energetic surgical laser beams. This work earned him the Jolodan award for outstanding research in the field of biomechanical engineering. In 1986 he moved to Sunnyvale CA where he worked for Analatom, Inc., a small R&D firm, conducting research under contracts from NASA, DARPA and the Air Force on the development of laser techniques for supersonic air flow diagnostics. His work resulted in the development of a system for non-intrusive O_2 temperature measurements in supersonic and hypersonic airflows. In 1989 he joined the Faculty of the University of Virginia. His research interests include applications to engineering and medicine of laser and optical techniques. Currently his work includes the development of new techniques for supersonic flow and supersonic combustion diagnostics and for surface analysis of high temperature composite materials. Recently, a system developed by Dr. Laufer and his colleagues was successfully used for imaging of combustion species in a large-scale, pulsed NASP combustor. Dr. Laufer is the author of more than 60 technical publications. He has recently completed a text book on the applications of lasers and optics to engineering covering many applications that are relevant to aerospace, mechanical, chemical, and nuclear engineers including diagnostics techniques, laser metal processing, etc. Presently Dr. Laufer serves as an Associate Editor of the AIAA Journal.

Roland Krauss

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Education:

Ph.D. in Engineering Physics, University of Virginia, Charlottesville, VA, 1972.

Professional Experience:

1972-1985 Senior Scientist, Centrifuge Research Laboratory, University of Virginia, Charlottesville, VA.

1983-1987 Deputy Director, Centrifuge Research Laboratory, University of Virginia, Charlottesville, VA.

1985-Pres. Research Associate Professor of Engineering Physics, University of Virginia, Charlottesville, VA.

Research Interests:

Diagnostic techniques for non-reacting and reacting flows, including classical and non-intrusive. Surface temperature and surface strain measurement. Materials, controls, and heat transfer for producing high enthalpy, non-contaminated flows.

Principal publications:

1. Siegel, M.W., Krauss, R.H., and Boring, J.W., "Mass Spectra Simulated by O^+ and Ar^+ Interacting with a Surface," The Journal of Chemical Physics, Vol. 57, No. 8, October 15, 1972, pp. 3576-3578.
2. Laufer, G.H., Krauss, R.H., and Grinstead, J.H., "Multiphoton Ionization of N_2 by the Third Harmonic of a Nd:YAG Laser, a New Avenue for Air Diagnostics," Optics Letters, Vol. 16, pp. 1037-1039, 1991.
3. Quaglioroli, T.M., Laufer, G., Krauss, R.H., and McDaniel, J.C., "Laser Selection Criteria for OH Fluorescence Measurements in Supersonic Combustion Test Facilities," AIAA Journal, Vol. 31, No. 3, March 1993.
4. Abbitt, J.D. III, Segal, C., McDaniel, J.C., Krauss, R.H., and Whitehurst, R.B., "Experimental Supersonic Hydrogen Combustion Emplying Staged Injection Behind a Rearward-Facing Step," Journal of Propulsion and Power, Vol. 9, No. 3, May- June 1993.
5. Grinstead, J.H., Laufer, G., Krauss, R.H., and McDaniel, J.C., "A Calibration Source for OH Laser-Induced Fluorescence Density Measurements Using Thermally Dissociated H_2O in Atmospheric Air," Accepted for Publication, Applied Optics.
6. Quaglioroli, T.M., Laufer, G., Hollo, S.D., Krauss, R.H., Whitehurst, R.B., and McDaniel, J.C., "KrF Laser-Induced Fluorescence Imaging in a Supersonic Combustion Tunnel," Accepted for Publication, Journal of Propulsion and Power.